EGYPT TOMORROW ECONOMIC FORUM
Video Interviews

THE CORONA ECONOMY: CRISIS & OPPORTUNITIES

EPISODE SEVEN: ARTIFICIAL INTELLIGENCE IN FIGHT AGAINST CORONAVIRUS

Interview with Galal El-Beshbishy,
Artificial Intelligence Strategist,
Co-founder and COO of Synapse Analytics,
& member of CIPE Egypt Tomorrow Economic Forum

*Interview conducted by **Seif ElKhawanky**, CIPE Egypt Program Officer,*
on April 9, 2020

Background: In response to the coronavirus crisis and the havoc it created on a global scale, CIPE's Egypt Tomorrow Economic Forum "Masr Bokra" launched a new video-based interview series title, 'Corona Economy: Crisis & Opportunities'. The series invites leading Egypt's business leaders, young entrepreneurs, academics, opinion-makers, policy makers, and leaders of think tanks to share their perspective on the evolving situation and implications for the economy in general, and the business environment. The series provide insight and analysis into the economic and social impact of the current crisis, both at the macro and the micro level, and attempt to glean insights into the path ahead.

The transcript below has been condensed and edited for clarity.

CIPE: *Welcome to a new episode of the series, 'Corona Economy: Crisis and Opportunities'. The series was launched to provide insights into how we can weather the coronavirus crisis, healthwise and economically, and at the same time, identify economic opportunities and suss out how best we can move forward. Today, our guest is Galal Elbeshbishy, a member of CIPE's Egypt Tomorrow Economic Forum "Masr Bokra"; Galal has a data science and artificial intelligence (AI) startup. He will talk to us today about existing opportunities and how best to use the various data science and artificial intelligence tools to navigate through the crisis, healthwise and economically,*

Link to Arabic Video: https://www.facebook.com/CIPEArabia/videos/2729112353878927/

as well as highlight the potential opportunities that can arise in the future. Welcome Galal. Could you please start off with explaining the concepts of data science and AI, and then proceed with telling us how you are using these tools in the Egyptian context to help us get through the current crisis, healthwise and economically. Finally, I would like you to talk about the prospects for applying these tools in Egypt in the future.

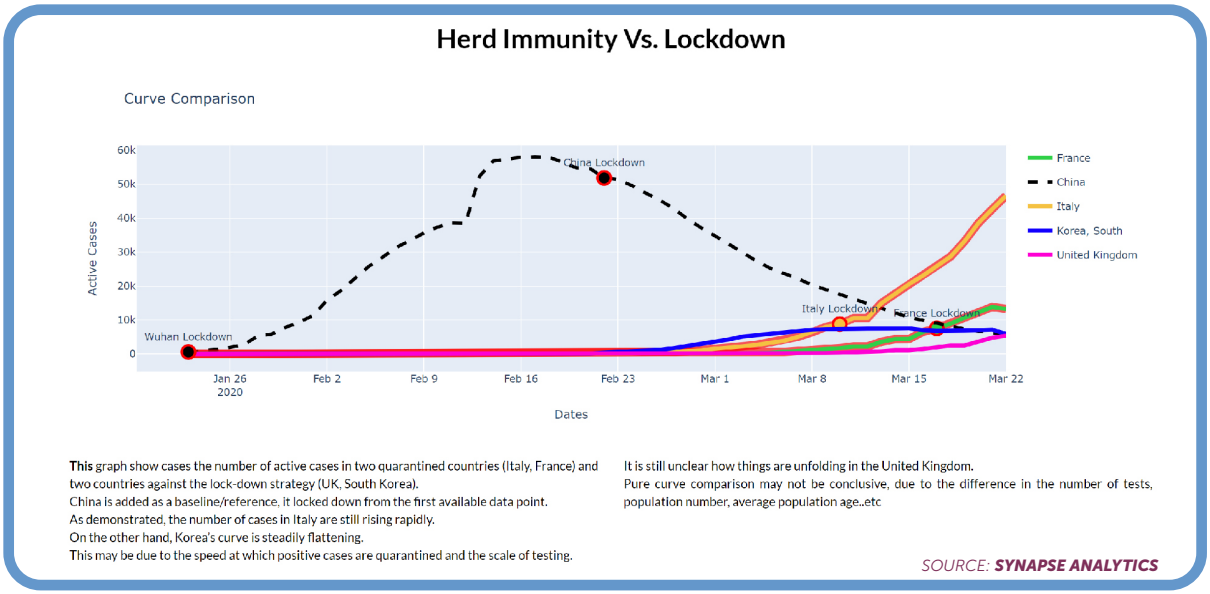
El-Beshbishy: Hello Seif. When we talk about the concepts of AI or big data, we are basically talking about a special way for storing data, using an infrastructure that allows us to process the data in a manner which is fast and intelligent. This enables us to generate useful information. In other words, we are able to use massive denoised datasets—data that does not include unconfirmed information—to produce useful information for decision-making. The main reason for the rising prominence of AI science is what we call "big data". Different forms of data are now becoming widely available, whether this data is held at government agencies, or available on social media platforms, or stored in other data repositories; data is also now more accessible, and anyone can own their own data and freely present it. This widespread availability of data and the increased access allow technologies, such as AI, to take advantage of huge volume of data, and apply what it has learned from data it has seen before to generate information and predict behavior or future events. As for the relevance of these two concepts to the current situation, I would say that we can apply these concepts to mine-through the huge volume of data, after removing the noise that is definitely there, and try to understand how the pandemic is spreading, as well as predict how it would spread, and how best to deal with this spread based on what we have seen before.

CIPE: *Just to confirm my understanding, big data allows us to predict how the virus will spread so that we can get prepared, correct?*

El-Beshbishy: Correct. AI is similar to computer programming, but in the case of AI, it takes advantage of the wide availability of large volumes of data to learn from—learn from the data it has seen before, and current data too. It attempts to establish patterns that can help in making predictions about future events. For example, we have seen countries deal with the pandemic in different ways, AI allows us to learn from these experiences, and predict the impact of the virus on Egypt and the Egyptians. So basically, what you are trying to do is to use the available technology to look into what happened earlier, learn from it, and apply what you have learned to predict the spread of the virus based on how other countries tackled the situation. For example, you will find that some countries adopted a complete lockdown, while others imposed a curfew during certain hours, or continued with normal operations while taking necessary precautions; each of these strategies generated its own outcomes; we can then use this information to predict the spread of the virus in Egypt depending on which strategy we adopt.

CIPE: *Let us divide this discussion into two parts. Let us first talk about the strategies adopted by different countries in dealing with the spread of the virus and what we have learned so far, and then move on to discuss how best can Egypt benefit from these experiences.*

El-Beshbishy: Looking around, we find that many countries have adopted a total lockdown strategy, while others opted to impose curfews during certain hours. China, for example, imposed a total lockdown in Wuhan after the number of infections spiked; the rapid spread of the virus did not allow people enough time to grasp its reality early on. Later, China imposed a total lockdown across the country in an attempt to stem the spread of the virus; they were able to reduce the rate of infection. Other countries, including Italy, Spain, France and the UK imposed a total lockdown (albeit UK's lockdown is a little different); Singapore carried out public awareness campaigns, and prepared itself by guiding people to continue with work while taking certain measures, including social distancing, eating alone, and reducing overcrowding in their public transport system. Thus, countries dealt with the issue in different ways; the approach each country adopted relied on a number of factors, including the extent to which they were able to raise the awareness of the public; their resources and



infrastructure, and the swiftness of their response. Some countries responded swiftly as soon as they learned about the situation in China and promptly started issuing guidance to contain the virus. Countries that responded swiftly presented a better way of dealing with the pandemic, compared to other countries that neglected the spread of the virus; the slow response in countries resulted in them having to resort to imposing a total lockdown. Statistics indicate that with a total lockdown, the rate of the spread of the virus declines, even with an increase in the number of infected people, a point which I will expand on later. So, some countries, such as Singapore, were able to reduce the rate at which the virus spreads without imposing a total lockdown. The problem we are facing now is the extent to which we can rely on these figures, as we are looking at active and recorded cases of COVID-19, whether they received treatment or not. Many companies, including ours, carried out studies to investigate the relationship between the number of tests administered and the number of recorded cases. We established that there is a positive correlation between these two variables. I should note here though that there would be some who would argue that testing is increasing because the spread of the virus is wider; true, we are using a set of assumptions here that led to this finding; the real problem is that we cannot take the number of active cases only, and start using them to build a model for predicting the spread of the virus, these figures alone are not adequate. To get a fuller picture of

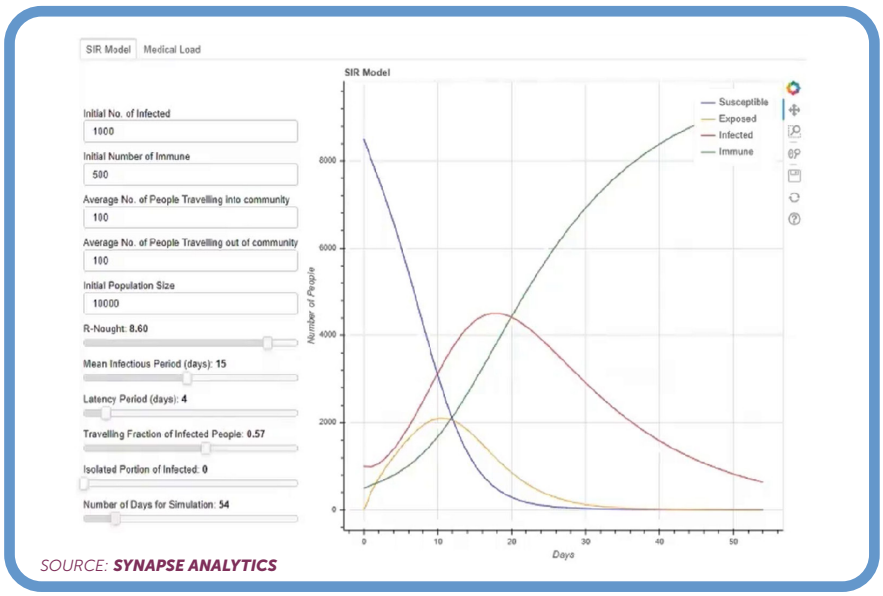
what is happening in a country, we need to have more information about the country's capabilities, including the number of tests administered; the number of available hospitals, the number of available isolation beds to name a few.

CIPE: *You mentioned that you are using numerous assumptions, could you please expand on this, and tell us what type of data are you looking for to help generate useful information?*

El-Beshbishy: We look at many variables. We look at the GDP per capita, adjusted by purchasing power parity to allow for a fair comparison between countries, as it is important to know how much a citizen can spend on, say, health care. We also look at the country's spending on testing, as well its capacity to administer tests and the regulations or policies governing testing, such as availability. In this respect, we find that early on, the cost of getting tested in the US was very high, to later be reduced; other countries required the presence of symptoms to qualify for testing, while others were offering mass testing in an attempt to control the spread of the virus. We also use other variables for making our forecasts, including the number of confirmed cases, the number of hospitals, and the number of hospitals with isolation space. In brief, to create our forecasts, we use available data and evidence from other countries, in addition we make educated assumptions, grounded in reality; this allows us to predict the spread of the virus and determine how best to contain it.

CIPE: *So, is the prediction model you developed Egypt-specific or could be applied to other countries?*

El-Beshbishy: *The model* that I will share with you now was developed for Egypt (guest displays the model on the screen). I would like to note here that due to lack of data, we developed the model based on our own assumptions, if these assumptions hold true, the model can predict the expected spread of this pandemic. So, if you look at the screen, the red curve represents that number of people who are infected. To make our predictions, we started off using a number of variable, including the number of confirmed cases and the number of cases that were treated and reintegrated in the community (by the way, this exercise can be applied to any country or any community

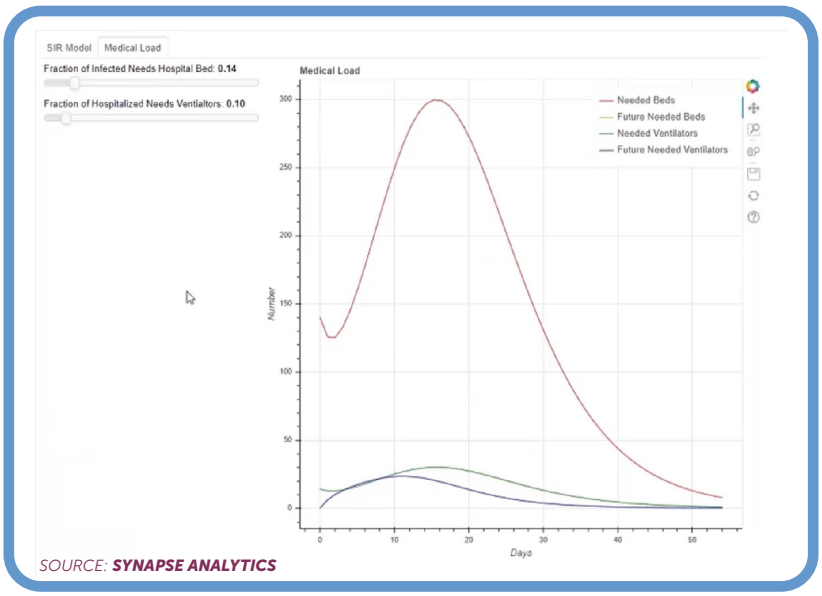


SOURCE: ***SYNAPSE ANALYTICS***

within a country). We then estimated the number of individuals who enter and exit the community on daily basis, i.e., mobility of community population, as well as the number of individuals residing in the community. We also applied the "R0", which is a measure of the average number of people who will catch the disease from a single infected person, an increase in the value of "R0"indicates that the individual can cause higher infections. We use the red curve, which represents that number of people who are infected, to gauge the spread of the virus; the steepness of the curve will depend on many factors, including the value of the "R0", whenever you assume that the disease infects more people, your curve get steeper, in other words, there will be a spike in infection in a shorter time period. Based on some research, we determined that 7 is a realistic estimate for the "R0"; and just a reminder, the lack of data is a major challenge we all face, thus we make assumptions. At any rate, you use this model to try to understand how different variables affect the spread of the infection; you should then try to improve the numbers to flatten the curve. Since we are not able to control some variables, such as the "R0" and the latency period, which is the time from infection to infectiousness, we should try to influence other factors, which are within our control, such as the isolation portion—the number of individuals who are isolated. We find that with more individuals isolating themselves the curve flattens. So, the idea behind this model, is that you can use the data you have, and include other variables to predict the spread of the virus. I would like to stress here that many of these number are not fixed, and vary from one individual to another, and from one domain to the another, and are sensitive to demographics. I would also like to add that this is an open source model that others can use, enter their own assumption and be able to predict the spread of the virus in their own country or community This is in a nut shell the idea behind this simulation

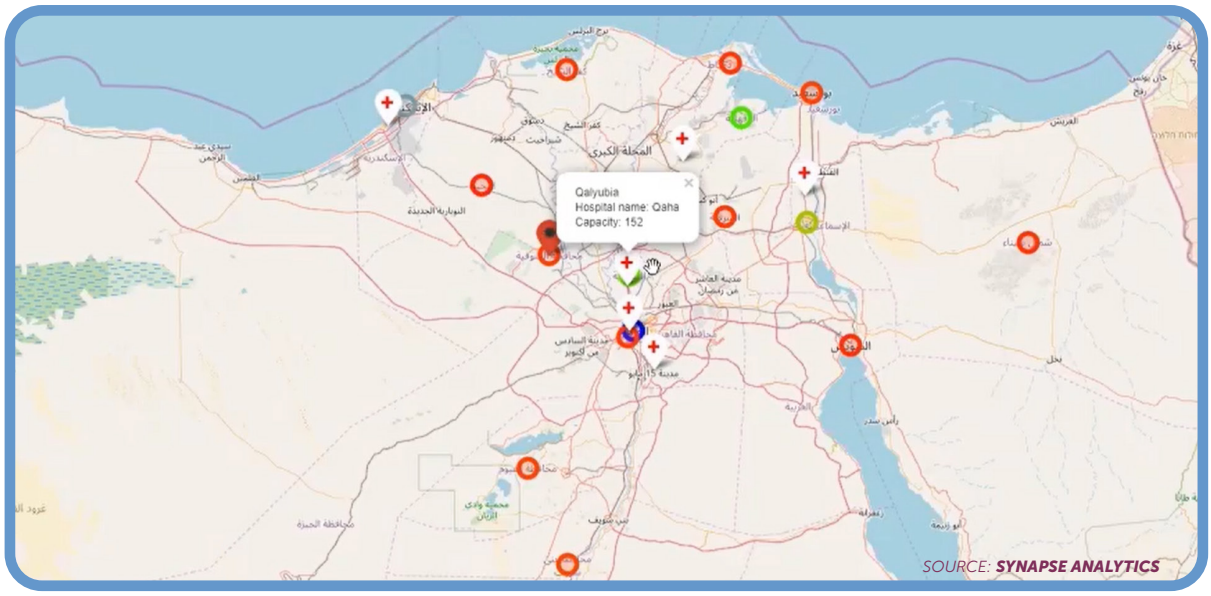
CIPE: *So, can this model be used by policymakers? They just need to enter their data, and the model will provide them with a forecast. Correct?*

El-Beshbishy: Exactly. They can enter their data and make their assumption to generate the forecasts. For example, they can use it to forecast the total number of beds or ventilators needed—the medical load. In our model, we are assuming that 14% of the infected individuals will need beds, but you can always change the assumption



SOURCE: ***SYNAPSE ANALYTICS***

based on your circumstances, including for example demographics factors, such as age. Again, I would like to stress that in developing our model, we factored in the fact that there is a large volume of data circulating around, which no one is yet sure of its accuracy, and also the high levels of coronavirus anxiety floating around; both these factors generate a lot of noise around the data. At this point, what we are certain about is the manner in which each of our assumptions affect the spread of the virus. So, for example, when we take isolation, we know that the spread of the virus is negatively correlated to isolation, i.e., the higher the number of isolated individuals, the lower the spread of the virus, this is confirmed by statistics drawn from the experience of other countries. We did another exercise which entailed plotting the number of hospitals with isolating beds across the country (guests display a map of Egypt on the screen). We also developed an algorithm that allows the assigning of patients to hospitals; the assigning of patients is made irrespective of the proximity to the hospital, rather, it is based on the availability of beds in hospitals nationwide. So, a patient could be assigned to a distant hospital, because, based on the model, it is predicated that the hospital closest to the patient will experience very high demand, and the patient will be better served assigned to a more distant hospital. This will optimize patient bed assignments, ensure that every patient finds a hospital bed, and maximize the utilization of our resources by adopting a smart and agile approach.



CIPE: *This can also assist policymakers with deciding where to build hospitals?*

El-Beshbishy: Yes, and it can also assist with deciding on where to add beds in existing hospitals. Indeed, AI can be very helpful in this regard, it can help with determining where to invest based on the number of cases, and the population density. There are many applications in this area, but I just wanted to give you a snapshot what we are doing, so that others can start not only using it, but also building on it. There are other companies that have developed similar initiatives, and we are working with them, so that we can help the state, contain the virus and pass through this crisis safely. It is important that decision-making be based on accurate data, particularly that the economy is at stake, and economic activities are affected by the lockdowns; indeed, lockdown can adversely affect the entire population. These tools can certainly help with decision-making.

CIPE: *So, these tools can help us determine which regions should go in total lockdown, and which should not, correct? In other words, we can use different lockdown strategies based on real data, and thus, we are able to make informed decisions that can help in containing the virus and arresting the spread of infection by adopting either strategy.*

El-Beshbishy: Exactly. The choice of strategy, whether a full lockdown or a semi lockdown, will depend on the number of cases, the rate of increase in infection, and the number of hospitals in the region, etc. In other words, we do not have to impose a full lockdown across the country.

CIPE: *Just to confirm, the data needed for this model include the number of cases, the medical infrastructure, population density, to name a few, correct?*

El-Beshbishy: Yes. But to predicate the rate of infection in Egypt, the model also uses evidence from other countries, such as data related to how the infection spread. Basically, we look at other countries with circumstances similar to ours, and we look, for example, at the impact of a full lockdown in an area on the spread of the infection. We can then apply this information to the Egyptian case, and forecast how infection will spread. We can also use data available online or from other sources for coming up with our predications.

CIPE: *This is great. Thank you Galal. Many were wondering how technology, digital transformation, and AI can assist with containing this pandemic; you have provided us with a comprehensive model that can be used towards getting through this crisis. Perhaps it can also be used in the future for designing public polices in general. It would be good to discuss this broader application later, specifically how to use data to develop public policies in the different sectors.*

El-Beshbishy: This is true. And you should also know that there are many startups in the market that are working on a number of initiatives; they are also making these models available online for anyone to use. We are making our model available on line so that others can improve on. We can then provide a good architecture that will allow us to make intelligent decisions based on accurate data.

CIPE: *Thank you again Galal and thank for letting us know that it is an open source model. It is always good to introduce such ideas and thinking in the Egypt Tomorrow Economic Forum "Masr Bokra".*

El-Beshbishy: Thank you Seif.

Galal El-Beshbishy is an artificial intelligence strategist, and co-founder and COO at Synapse Analytics, Egypt. Galal obtained his Bachelor of Engineering with honors in 2016 from Virginia Tech, Virginia. In 2015/2014, he was a research engineer at the Bio-Sonar team at Virginia Tech. Galal recently joined CIPE's Egypt Tomorrow Economic Forum